

The Kamehameha Butterfly, *Vanessa tammeamea* Esch.

BY FRANCIS X. WILLIAMS

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In the Hawaiian Islands we have but two native butterflies, the large sturdy, red and black *Vanessa tammeamea* and the little bluish, or blue and black *Lycaena blackburni* (Tuely), with the underside of the wings green. Of the eight remaining species of butterflies that occur here, two have been imported from Mexico to help destroy the land-grabbing Lantana bush, one arrived by accident from somewhere farther east and made itself very unwelcome by destroying the seeds of the Pigeon-Pea (*Cajanus cajan*) and the Sunn Hemp (*Crotalaria juncea*), two valuable cover crops; another pest is the familiar "Cabbage White" that disfigures the leaves of cabbages and nasturtiums; a fifth species is the large tawny red and black "Monarch" or "Milkweed" butterfly frequently seen in our towns and city, while the three remaining

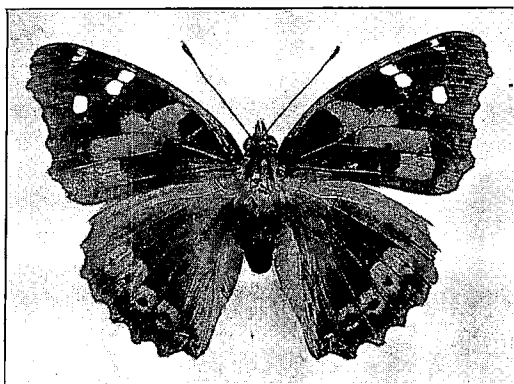


Fig. 1. Kamehameha butterfly, about natural size.

kinds are relatives of the Kamehameha butterfly and insects of wide distribution.

Both of the native butterflies are normally mountain or forest dwellers and for that reason are quite unfamiliar to a large proportion of our population. The delicate little *L. blackburni* might well pass unnoticed, but the Kamehameha butterfly is a conspicuous

though swift-flying insect that may span three inches or more across outstretched wings. In pattern and color it bears considerable resemblance to the Red Admiral (*Vanessa atalanta* Linn.), a butterfly familiar both in Europe and America and occurring also on the island of Hawaii; a more nearly related insect perhaps, is

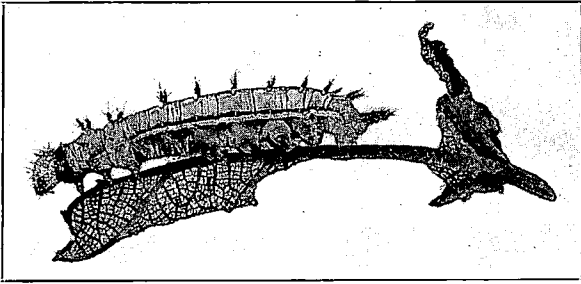


Fig. 2. Kamehameha butterfly larva, natural size.

the New Zealand *Vanessa gonerilla* (Fab.), but its closest relative and one well nigh indistinguishable from it is *Vanessa callirhoë* Fab. from the distant shores of Madeira.



Fig. 3. Kamehameha butterfly pupa, natural size.

During the latter half of the year 1926, I had occasion to frequently visit the haunts of the Kamehameha butterfly and to rear it in considerable numbers from caterpillars secured in the last stage of growth. The several food plants of the caterpillar belong to

the family Urticaceae, of which the fibre plant "Mamaki" (*Pipturus albidus*) is the most favored, with *Urera*, *Touchardia* (=olona) and *Neraudia* also serving as food; these shrubs grow where there is good soil and sufficient shade and moisture and thus occur chiefly in the canyons. The butterfly itself, however, may occasionally be found at some distance from its food plants and rather infrequently strays into the city; in the mountains it is often semi-gregarious on the edge of a wood or in a small clearing, having a particular fondness for resting on the trunk and limbs of rugged old Koa trees. Very often it is the moisture or sap that attracts them there; at any rate it is no easy matter to discern one of these insects as it rests with the dull colored underside of its closed wings resembling somewhat the bark of the tree. When conscious of danger the butterfly partly opens its wings, thus displaying its truly gorgeous livery and shuts them again, often in a trembling manner; it is a rather difficult insect to net and when captured its vigorous struggles often render it quite unfit for a cabinet specimen. The females may be distinguished from the male by the presence towards the apex of the forewings of several white spots; in addition she is a generally larger insect with the forewings somewhat wider towards their tips. The Kamehameha butterfly is common in the mountains behind Honolulu and is widely distributed in the archipelago where conditions are to its liking. Most of my observations on it were made on Tantalus (Puu Lehua), and as the main object was the rearing of adult butterflies, little attention was paid to egg laying or to young larvae. Of course the habits and the early stages have been observed heretofore, by Blackburn, Perkins, Swezey and others and so some of these notes may be more or less of a repetition of what has been recorded in earlier days. Several times female butterflies were noticed hovering about *Pipturus* plants and one apparently laid eggs on the stem near the base of one of these bushes; the young larva makes a shelter for itself by cutting in from the margin of a leaf and turning the resulting flap and fastening it down upon the leaf by means of silk; as it moults and increases in size the old retreats are abandoned for one of greater size, although in the last instar when the caterpillar has nearly attained its full growth no true shelter is formed, and it is then to be found freely upon the shoots and leaves. By far the larger number of these cater-

pillars are now mainly a bright green, and provided with inoffensive spines, a very few, however, may be a deep wine brown or sort of purplish with a contrasting line on the side of yellowish. What few chrysalids were seen in the field were suspended by the tail from the twigs of *Pipturus*. In order to pupate, the caterpillar becomes shorter and stouter, spins a mat of silk, which it soon grasps firmly in its anal prolegs, letting go its hold elsewhere swings down suspended tail first; this procedure, of course, is a matter of some hours, many more of which are necessary before it sheds its skin to turn into a pupa; it will be seen that the skin wrinkles somewhat as if becoming freed of the body of the caterpillar which straightens out as the next stage approaches, finally undulating movements—from tail to head—become apparent, a rent behind the back of the head appears in the caterpillar's skin and the pupa can almost be said to crawl out of it, the skin drawing farther and farther tailwards, though still firmly clinging to the silken sheet; at the last the skin is shriveled and free of the newly formed, high shouldered pupa, except towards the tail end of the venter, where it is firmly gripped, seemingly between two segments; the pupal tail armed with the cremaster, a stout peg-like process bearing fine hooks pulls out of the skin and during the vigorous turnings that now take place, hooks itself firmly into the mat of silk; the shrunken and inconspicuous skin usually dropping off in the scuffle. The soft pupa hardens and assumes a better proportioned form; it is not a conspicuous object and if suspended near or among dry *Pipturus* leaves of pale grey and black shades, may indeed be difficult to locate. In perhaps ten days or so, the color and pattern of the butterfly's wings are visible through the wing cases, the abdomen telescopes out a little, and eventually the seams behind the head, at middle of the back of the thorax and before the wings give way before the struggles of the butterfly which pulls itself out, turns about and grasping the now empty shell suspends itself from it so that its stubby little wings may expand and stiffen. It is a matter of several hours before the butterfly is strong enough to take wing and be off.

Not very much success, however, attended my efforts to rear these butterflies. Hundreds of caterpillars were secured in about half a year's time and given plenty of fresh leaves and space; but they proved delicate and temperamental and if they did undergo their

metamorphosis successfully, more often than not undersized adults were the result. Sensitive and irascible too, it would appear, directly that the twig upon which such a caterpillar rests is disturbed it rears the fore part of the body to attention, and upon further molestation swings it vigorously from side to side, emitting at the same time a dark fluid at the mouth, thereby smearing considerably itself or any offending object; this effusion I am sure is detrimental to the larva as it thus loses considerable alimentary fluid in its exertions. This aggressive defence or most of it is soon lost in captivity, though it by no means indicates that the caterpillars are content in their prison, for they are often very restless therein. Only when the caterpillar is making ready to pupate may it again become very agitated though now ejecting no more fluid.

A great number of last stage larvae contracted a disease quite comparable to the wilt of the Gypsy moth caterpillar in the eastern United States; from a healthy green they would turn to a pale sickly yellowish green, lose their vitality, their appetite and regular intestinal functions, and finally turning almost suddenly to blackish, at the same time the tissues breaking down, would practically deliquesce so that the greater part of the unfortunate insect spattered upon a leaf below. This was by no means just a laboratory condition—but many similarly diseased and dead caterpillars were found at large in their forest home, where also the larvae of the moths of *Scotorythra* and *Plusia* were often similarly affected. Towards the middle of 1926, at the Parker Ranch on Hawaii, Mr. O. H. Swezey found what was perhaps the same disease working among the armyworms (*Cirphis unipuncta*), where it assumed epidemic proportions.

Realizing the difficulty of rearing butterflies in the comparatively warmer drier laboratory, many caterpillars were on different occasions netted in their own environment over a terminal branchlet of their food plant and while a number of pupae were thus obtained, the disease still persisted, affecting the pupae as well and showing thereon at first as a darkening of the body at the base of the abdomen. Furthermore, the bobinet prison was not proof against the caterpillar's jaws, or perhaps the teeth of wood rats too were responsible for the holes in the cloth and the missing larvae. No accurate percentage of loss by disease was kept in my

rearing save that out of a lot of 39 large caterpillars but nine adults were secured.

The Kamehameha butterfly seems remarkably free of parasites in the larval stages; and I reared only the large *Chalcis obscurata* Walk., on two occasions from pupae found in the forest. But one wasp issued from each pupa which seemed capable of furnishing sufficient nourishment for several more such wasps. However, Dr. and Mrs. H. L. Lyon of Honolulu collected a number of Kamehameha pupae on the island of Maui of the Hawaiian group and found them heavily parasitized by *Ecthromorpha fuscator* (Fab.), a large black Ichneumonid wasp of common occurrence and that destroys a variety of Lepidoptera in their pupal stage. Perkins (Fauna Hawaiiensis, Introduction, p. CLV-CLVI) has bred *Ecthromorpha fuscator* (*E. maculipennis*) and more rarely *Chalcis obscurata* from the pupa of this butterfly.